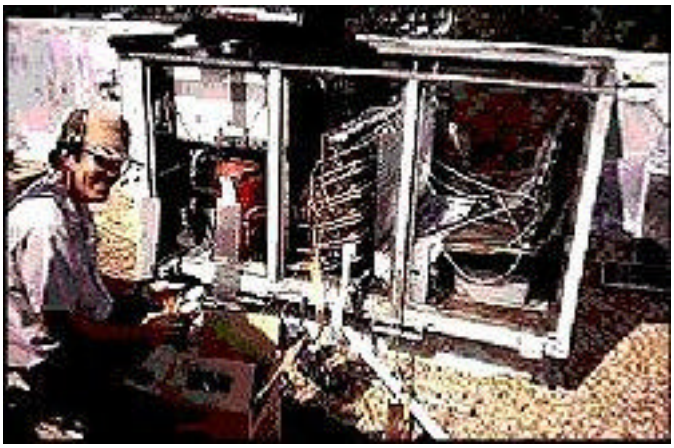
NASA Success Story

Heat Pipe Systems



NASA Kennedy Space Center (KSC), The Southern Technology Applications Center, Gainesville, Florida and the Florida Solar Energy Center teamed with several commercial firms to develop a prototype heat pipe system. Tropic-Kool Engineering Corporation, Largo, Florida worked with Heat Pipe Technology, Alachua, Florida, to supply and install heat pipes for a dehumidification research project for Burger King. With the sponsorship of Edison Electric Institute, Florida Power Corp. set up test equipment at a Burger King restaurant in Clearwater, Florida, to track temperature, humidity, condensate flow, and power consumption. After six months an analysis showed a 30-percent improvement in the moisture removed by the air conditioners, a 10-percent decrease in relative humidity, and a 17-percent reduction in HVAC power consumption due to the heat pipes. Tropic-Kool Engineering similarly demonstrated what heat pipes could do to increase the efficiency of air conditioners for Taco Bell Corporation. In conjunction with Heat Pipe Technology, a heat pipe system was designed and installed at a Taco Bell restaurant in St. Petersburg, Florida. The test results showed a 25-to-30 percent reduction in humidity levels, and a 38-percent increase in condensate flow levels. Taco Bell now specifies that all new restaurants in the southeastern United States will be equipped with heat pipe systems.

NASA Involvement NASA encountered heating and cooling problems in spacecraft early in the space program. Surfaces that face the sun become excessively hot, while the surface away from the sun became extremely cold. NASA teamed with the Los Alamos Scientific Laboratory to find a solution. The result was a simple heat transfer technology called the heat pipe. The heat pipe is a sealed tube containing a small amount of liquid refrigerant. The pipes are inclined so that the refrigerant flows by gravity to the lower end. The low end is an evaporator, the high end, a condenser. The refrigerant evaporates and absorbs heat as it flows to the low end. Vapor rises to the high end, where it releases heat and condenses into a liquid to repeat the cycle. NASA

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(Continued)

developed a broad program to refine heat pipe technology, demonstrate and commercialize it. Tropic-Kool Engineering Corporation, in conjunction with Heat Pipe Technology, are among the most recent participants.

Social/Economic Benefit Businesses that can benefit the most from heat pipe technology include restaurants, libraries, storage facilities, supermarkets, and any business that needs moisture-controlled air to preserve goods and products. Fast food restaurants have special problems in places of high humidity because of the cooking processes, volume of customers, and the code requirements regarding movement of outside air to the interior. Humid conditions cause restaurant fixtures and building materials to deteriorate due to water condensation. Repair or replacing equipment and high energy costs can be significantly reduced with addition of heat pipe technology. Heat pipes provide improved comfort levels, reduce moisture, improve air quality, and have no moving parts. Many times the humidity level can be reduced by 25 to 30 percent and cooling costs by 15 to 20 percent. Burger King Corporation and Taco Bell Corporation have both developed programs that incorporate heat pipe systems in their restaurants.

Industry Partner
Tropic-Kool Engineering Corporation

NASA Partner
Kennedy Space Center

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